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The Microchipped Tourist: Implications for European Tourism

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INTRODUCTION

New technologies have benefits and costs to consumers, businesses, and governments. However, the microchip is a technology that is a bit more controversial than many other technologies because it can be used in ways that are physically invasive (with questions of its impact on human health) and creates issues related to the ethics ([Foster and Jaeger, 2008](#)) and privacy of the user (Michael and Michael, 2009, 2012; Sarma *et al.*, 2002; [Weis *et al.*, 2004](#)). Despite concerns regarding safety and privacy issues, there are obvious benefits to the microchip. Here, we discuss this intriguing and powerful technology to look into how it may influence tourism in the future, while discussing the very real impediments it faces in terms of being implemented on a global scale.

The microchip and microchipped populations have been frequently mentioned since September 2001. The perceived threat of terrorism and the practical aspects of having a

microchipped population are strong arguments for the placing of microchips in people. Although, the technological capability for microchipping people have existed for some time (animals have been microchipped since the late 1980s), the discussion of placing microchips in people on a large scale is a relatively new public discussion. For many, it is a positive step, perhaps leading to the “singularity”, as Ray Kurzweil (2005) envisions, a time when humans transcend their biology. At any rate, it is one of many technologies that will have an impact upon the tourism industry in the future (Gretzel, 2012).

For the purposes of this investigation, we deal with the microchip as an intelligent piece of technology that is sub-dermal in either humans or animals, although it may also be implanted in non-living materials. Therefore, the references to microchips in this piece are to implanted technologies that have the ability to be read, transmit, or receive information. What this means is that certain types of non-organic things in a human body such as a breast implant or a titanium artificial hip are excluded from the discussion, although it is possible that in the near future these additions/appendages may be infused with intelligent chips as well.

In this chapter, we begin with an introduction to the RFID chip, explaining its history, capabilities, and current uses. We then look into the logic of resistance to implanted microchips, highlighting the concerns regarding health, safety and surveillance. Then, we explore the implications of the microchip for European tourism, explaining how it will be used in the industry in the future. Finally, we conclude with a discussion regarding the

trajectory of this technology and its implications and application in the European tourism industry.

HISTORY OF THE TECHNOLOGY AND ITS CAPABILITIES

Implantable identification devices are based on the RFID (Radio Frequency Identification) technology and are an outgrowth of the technological development of radar, a technology widely used during the twentieth century and today. Radar was developed in the 1935 by Sir Robert Alexander Watson-Watt, a Scottish physicist, and was used widely during World War Two by many of the countries involved in the war to warn the base on the ground of approaching aircraft. A problem that occurred was the aircraft could be spotted by radar but it was impossible for the radar to determine whether the approaching aircraft were “a friend or a foe.” The British military developed an active RFID system through two-way communication between the plane and the radar, so precision in identifying aircrafts was achieved (Newitz, 2004). It remained well known as the “Friend or Foe” identification system and used widely during World War Two.

Although the technology was developed during World War Two, the non-military application did not catch on to a large degree until the 1970s, when the first commercial electronic article surveillance anti-theft systems became available to the public. Today, RFID technology is rapidly replacing old-fashioned bar-codes ([Garfinkel *et al.*, 2005: 34](#)), and is mostly used in the supply chain management, electronic credit and key-cards, contactless fare-payment systems in public transport, etc (Halamka *et al.*, 2006: 602). The advantage of RFID technology over barcodes has to do with the readability of the

information scanned. For example, a supermarket scanner for a barcode may be problematic if the bar code has been smeared for one reason or another or has a thin layer of ice over it, making scanning difficult or impossible. With RFID technology, such a difficulty should not occur. That's why RFID technology has been widely adopted in various industries and with versatile applications like in medicine/health care ([Carr et al., 2010](#); [Smith, 2007](#); [Wang et al., 2010](#)), logistics ([Langer et al., 2007](#), [Ross et al., 2009](#)), retail ([Bardaki et al., 2012](#); [Bertolini et al., 2012](#); [Uhrich, 2008](#)), manufacturing ([Huang et al., 2012](#); [Ngai, 2010](#); [Zelbst et al., 2012](#)), in passports ([Ramos et al., 2009](#)), in companies' loyalty programmes ([Bayraktar et al., 2010](#)), as access cards for museums ([Hsi and Fait, 2005](#)) and numerous more. Because of the advantages of the RFID technology, it is estimated that up to 50 million Americans carry an RFID tag with them every day ([Garfinkel et al., 2005](#): 34).

At present, the RFID chips are about the size of a grain of rice. They most commonly consist of an anti-migrational bio glass capsule made of silicon, sodium, calcium, potassium, magnesium, iron and aluminium, which contains a chip with a radio frequency emitter and an antenna. The substances that the capsule consists of are biocompatible with animal tissue and are easily accepted by the fibrous tissue ([Vascellari et al., 2004](#): 188). They are usually implanted under a person's back of the arm, under the skin and are passive, meaning that they are only powered by the chip reader, therefore do not need any other source of power (i.e. battery), and have a short range (up to 1 m). It usually communicates a unique 16-digit number, which can be referenced in a given database and provide information about the bearer of the implant ([Halamka et al., 2006](#):

601). Its predicted lifespan is roughly 15 years (Halamka *et al.*, 2006: 602). However, there is another type, an active location or identification devices, have a longer range (up to 100 m), and are powered by a battery. They are currently about the size of a pager, but as technology develops rapidly, in the future their size and price will drop, and battery life will expect to be expanded (Halamka *et al.*, 2006: 602).

There are three different types of chips, which differ in the way they store data and the function they are capable of performing (www.rfidlabeling.com). The most basic form contains a “read-only” function, meaning that once the data is input, it cannot be altered, corrected or erased. This type of identification device could be effectively used as a national identification card system. The second type, with the so called “read-write” capacity allows for data modification and is programmable from a distance. Its use could vary from keeping track of one’s medical history or a criminal record, to facilitating financial transactions. Finally, third and most advanced kind of identification device is the “read-write with tracking capabilities” which is able to store modifiable data and can be easily tracked.

The implantation of microchips using RFID technology were first introduced in animals in the early 1990s and have since been used on a wide-scale basis in many different countries. There are good arguments in terms of the microchipping of animals, since it is largely seen as safe, painless, and effective, and as such implanting RFID microchips in pets has been used a great deal since the start of the Pet Travel Scheme (Vascellari *et al.*, 2004: 188). Globally, it has been so widely used that over 50 million dogs and cats

already have chips (Halamka *et al.*, 2006: 601). At present, about 80 countries or territories require microchips in pets (PetTravel, 2012). What is remarkable is that the list of these countries includes some countries that are less developed, such as Albania, East Timor, Malaysia, and Nigeria. Indeed, the microchipping of animals is so widespread that it is hardly news.

The first human has been chipped in 2001 (Albrecht, 2007) and since then only a small number of people has undergone the procedure. With only a small number of humans being microchipped, there are no clear data available on the potential adverse health effects on humans. The US the Food and Drug Administration (FDA) approved implanting chips in humans in 2002 (Halamka *et al.*, 2006: 601) mainly as a result of the fear resulting from the 9/11 attacks in the USA in 2001 and the fallout from Hurricane Katrina in the USA in 2005. The company that holds the technology for the embedded chip is PositiveID, formed by the merger of VeriChip Corp. and Steel Vault Corporation in November 2009 (PositiveID, 2009) and as of July 2012 it is the only US Food and Drug Administration-approved chip to place in a human. When approving the chip, the FDA had acknowledged potential consequences to the chip bearers – potential for adverse tissue reaction, migration or infections resulting from the implanting procedure, failure of the implant, electromagnetic interference, electrical hazards and MRI (Magnetic Resonance Imaging) incompatibility (Halamka *et al.*, 2006: 602; Nsanze, 2004: 55).

The microchipping of humans has been done on a much smaller scale than the widespread use in animals in many countries. In 2002, a three-member family in Florida had the microchips implanted in them in order to store important medical information (BBC, 2002). In 2004, the Mexican Attorney General and 17 of the people in his office were implanted with the VeriChip in their triceps to give them access to secure area ([Halamka et al., 2006](#)). Also in 2004, the Baja Beach Club in Barcelona, Spain gave customers the opportunity to have microchips implanted in them in order to give them access to the VIP area as well as using the microchip to act as a debit card to pay for drinks (BBC, 2004). The most recent large-scale study was in 2007 when 200 Alzheimer patients in Florida were implanted with the chip (Swedberg, 2007). In total, about 2,000 people worldwide have been implanted, according to the VeriChip manufactures (Bahney, 2006).

While the RFID technology is widely used in passports, credit cards, consumer goods and other non-living objects, and household pets as dogs and cats, there is very little evidence that the RFID microchip implants have been embedded into many people yet. However, reasons related to anti-terrorism, health protection, consumer efficiency lead us to the conclusion that the number of such people will grow exponentially in the future. This will create a new reality for the society and companies, including tourist enterprises, they should be prepared for.

IMPEDIMENTS: EFFECTIVENESS, SAFETY, AND PUBLIC SUSPICION

There are many arguments for and against the microchip and microchipped populations. The practical aspects of having information stored in something the size of a grain of rice has notable capabilities that are fairly obvious. The strength of the microchip is that identification of the microchipped individual will become a speedy process, as the microchip and the individual will largely be inseparable. While there are few that have opposed the usage of the RFID in pets and items such as passports, the implantation of the RFID chip into human populations has remained a controversial topic.

There are reasons why the RFID chip put into a passport may not elicit the same emotional response as the implantation of the RFID chip into a human. Mostly, the resistance to human implanting has to do with questions regarding the long-term health effects of the RFID chip under human skin and the implications for increased control by the state, due to the advantage of having RFID technology in the hands of the state. There is little or no concern regarding the long-term impact of the RFID on the passport, for example. For pets, while pet owners generally value the lives of their pets, the shorter lifespans of most household pets relative to humans and the general recognition that the value of a pet's life is less than that of a human creates an environment in which the casual microchipping of dogs and cats does not elicit fierce public resistance. While in many places the microchipping of a dog is required by law and such laws have elicited little resistance, having such a legal requirement on humans would likely meet with substantial public and political resistance.

First, let's explore the arguments for the practical aspects of the RFID chip in humans. Table One below highlights the major arguments for microchipped people and gives an example. The major advantage to having a microchip inseparable from a human is that bodies found after a disaster or in an emergency situation can be identified. After Hurricane Katrina hit the USA in 2005, there was the practical issue regarding identifying a large number of bodies found in the aftermath of the storm. While documents informing the authorities about the person carrying them may be forged or separated from the individual in an emergency, a RFID microchip implanted into a person will almost never be separated. This is also important in terms of the storage of vital medical information. While a person implanted with a microchip may be unconscious, the RFID chip in the person's arm may indicate to medical personnel such important information, such as which medications the person is allergic to. Such arguments are made by Health Link in their advertisement for the RFID chip produced by Ball Marketing in 2008.

Table 1 Microchipped People: Arguments and Examples

Argument	Example
Police and other authorities will be able to identify bodies found	Following natural disasters, police will be able to quickly identify bodies
Stores vital medical information about citizens	Paramedics will be able to identify a person found in an accident and have medical information regarding their medical conditions/allergies
Payments simplified	Customers will simply be scanned at checkouts, with no need to use PIN numbers of credit cards
Eliminate lines at checkouts	Scanning products chosen for checkout will be simplified and made faster, as will payment
Security and Safety	Child abductions will be avoided, since people entering buildings will be registered at the entrance and children can be tracked by their RFID chip
Reduction of workforce needed	With simplified payments and simplified security, fewer checkout and security personnel will be needed

Eliminate need for biometrics	Tourists entering a country can use a microchip to identify themselves instead of biometrics, a less reliable technological approach
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There are other basic advantages of the implanted RFID chip, such as identifying people, simplifying payments, the reduction of labour, and displacing biometric technologies.

One obvious advantage for many consumers would be that they would not require a wallet to store credit cards or cash, since many transactions would be done via a quick scan done on a particular part of the purchaser's body. It would be easy to imagine a nudist going to a beach bar and purchasing something to eat or drink without having concerns regarding the theft of a wallet while swimming in the water.

However, each of these advantages has weaknesses. Some of the major disadvantages of the technology are that there will be major issues of privacy and the imperfections of the technology create problems such as the counterfeiting of the signals given out. [Halamka et al. \(2006\)](#), for example, note that there are many weaknesses of the technology, since certain types of clothing and metal may make it difficult or impossible to read the chip and the signals given off by the RFID chip may be mimicked ("spoofed") by another device.

Health issues are also a major concern. While the FDA approved the use of the RFID chip in humans, there are still some risks that have been brought up and many more that may be learned about only after a large number of people have been implanted for a long period of time. However, since pets such as dogs and cats have been implanted with

RFID chips for quite some time, the information regarding the risks to humans can be inferred from data on household animals.

The major health concerns that have been voiced regarding problems linked with implanted RFID chips are malignant tumours, reactions of the body to the implant (foreign body tumorigenesis), post-injection inflammation, and other concerns linked with the properties of the implant and the emissions from the implant (Albrecht, 2007). There are other issues linked with the implantation of the microchip. For example, an implanted microchip may migrate from the place where it is implanted, it may be improperly implanted, it may fall out of where it is implanted, or it may fail to function after it has been implanted.

While there is not yet a great deal of data regarding the impact on human health, there are a number of research studies investigating the linkage between the implantation of microchips and undesired health effects ([Le Calvez, 2006](#); [Vascellari *et al.*, 2004](#); [Vascellari *et al.*, 2006](#)). Albrecht (2007) reviewed the literature on animal tests of implanted RFID chips. What she found is that the majority of veterinary studies do not illustrate that a cancer has been observed around or adjacent to the implanted microchip in the animals in most of the studies. However, in some of the tests in which there were larger numbers of animals used, there were malignant tumours that developed in mice, dogs, or rats. While the RFID chips have been implanted in household pets for quite some time in many countries, it does not appear that there is systematic evidence as to the ill health suffered from these implants. What we can infer is that while there is health

risk, the risk seems, at least from most of the animal tests and animal implants in a non-laboratory environment, to be minimal. However, there is always the question of when “minimal” is “acceptable.”

Apart from health risks, there is a great deal of social resistance to inserting the RFID chip into humans due to concerns about lack of privacy. Academic studies have shown some concern regarding issues of privacy and the RFID chip (see for example, Sarma *et al.* 2002, [Weis *et al.* 2004](#)). Certainly, the RFID chip is a way that the police and other authorities may track the purchases and movements of people in a society (see also [Michael and Michael, 2009](#)). In a society in which the police and other authorities remain within certain boundaries, respecting the civil liberties and privacy of citizens, concerns regarding who has access to the RFID information may be not particularly problematic. However, in a place in which the governmental authorities wish to have full knowledge of the movements and purchases of citizens, the RFID chip becomes a major tool to control and intimidate a population.

There is so much concern regarding the power the RFID chip gives to authorities that the RFID chip plays a central role among those who are concerned about the increasing invasiveness of intelligence-gathering in Western societies and the increased power such technology gives political and economic elites. In the film *Zeitgeist*, Aaron Russo, the Hollywood producer of such films as *Trading Places* and *The Rose*, recounted a discussion he had with Nick Rockefeller, a member of the Rockefeller family. According to Russo, Nick Rockefeller indicated to Russo that “The ultimate goal is to get everybody

in this world chipped with an RFID chip.... And if anybody wants to protest what we do or violate what we want, we just turn off their chip.” The 2008 Bilderberg meeting included discussions of microchipping babies, in an effort to combat terrorism (Tucker 2008), indicating that global economic and political elites do consider implanting humans with the microchip an important goal. Even if very few citizens are concerned about the emergence of dictatorships/police states in developed countries, the public has shown some concern about these technologies (Cavoukian, 2004: 18).

The potential to use an RFID chip to gather data on individuals and control them socially, economically, and politically is quite staggering. For example, if RFID chips are used as a means of payments and physical expressions of money are extinct, turning off a chip, as mentioned by Aaron Russo means completely cutting off a person from the ability to purchase goods and services. Such concerns regarding the ability of unknown persons in government or other organizations to track people is understandable to many and will be a major impediment to public acceptance of a microchip among those who are suspicious of their governments. Indeed, one need not be only concerned about governments to have some suspicion regarding the chips and the privacy of information, as the private sector may also collect information from imbedded chips.

The failure rate and technical weaknesses with the RFID chip, including how hackable and reliable they are, are contentious issues and knowledge of the weaknesses of the RFID chip are problematic for the companies that are in favour of widespread use of them. Adam Savage, one of the stars of the TV show *Mythbusters* on the Discovery

channel has discussed in public how major corporations such as Texas Instruments, Visa, American Express, and Discover became involved to prevent an episode of the show from airing in which RFID chips would be tested for reliability, hackability, and other things (Savage, 2012). It seems that these major corporations who either make or intend to use the microchip do not necessarily want the public to know about the weaknesses and vulnerabilities of the RFID technology. Certainly, no new technologies are perfect, as shown by the recent (2011) concern regarding the efficacy of the contraceptive implant produced by Merck, as a serious malfunction was reported by an alarming number of female users who stayed pregnant despite the implant (Hope, 2011). An additional concern that many may have regarding the RFID chip is that while it is quite easy to get inserted, it takes some time and energy to locate it to remove it, as CNN's Robyn Curnow (2004) noted, in her case.

In the end, there will be a major confrontation between the practicality of the microchip implanted in humans and concerns about a police state and health risks to humans. While the practicality of the microchip is beyond question, some of the finer points of how to implement may be problematic, such as the implementation of safeguards against fraud/theft. There will also be new problems and forms of theft that come into being due to the use of a new technology (theft will be done via mimicking the signals of other persons' chips and some may actually be forced to have a microchip extracted from people in an act of theft). While there seems to be little evidence regarding the safety of the embedded RFID chip, publics will continue to be concerned about giving governments additional tools to use in order to spy on or to control them.

IMPLEMENTATION INTO THE EUROPEAN TOURISM INDUSTRY

The introduction of the human microchip implants on global scale will have huge implications on the development of the tourism and hospitality industry in Europe. We can identify several directions of the impacts elaborated in the sections below.

Visa and passport control

The introduction of the Shengen agreement in 1995 led to the removal of borders and border control between the participating countries. Currently (July 2012) 23 countries from the EU (all excluding Ireland, United Kingdom, Bulgaria and Romania) and 3 non-EU countries (Switzerland, Iceland and Norway) have signed the agreement. The removal of border control has stimulated travel a lot among Shengen countries due to the elimination of travel formalities. However, it caused some tension with illegal workers and immigrants that flooded the EU through some of the southern member states. As a reaction, few of the other members like France and Denmark have threatened in 2011 to restore the internal border controls within the EU in an effort to reduce the negative effects of immigration and illegal workers influx. The result of this short crisis within the EU was the highly debated proposal to introduce regulations for the temporary restoration of internal border control.

The massive introduction of implanted RFID microchip in humans on a global scale would eliminate the abovementioned tensions and would stimulate travel again. Firstly, the implanted RFID chip allows the visa and the passport to be in electronic form and to

be associated with a particular individual which decreases significantly the potential document forgery. This means that no one could travel with somebody else's passport as the passport (and the visa) is recorded on an RFID microchip, which on other hand is associated with a particular individual through sub-dermal implanting. Secondly, the implanted RFID chip allows fast document processing by border officials and the substitution of manual border checks by automatic border control. A traveller with an RFID-recorded Schengen visa, for example, would pass through a designated border corridor; the RFID readers alongside the corridor would read the signal, authorize entry into the EU for the RFID holder and automatically open the doors of the corridor to let the RFID holder into the territory of the union. Moreover, RFID readers could be installed within the internal borders of the union and allow greater control on non-EU travellers and illegal immigrants. Without RFID implant or with an expired RFID-recorded Schengen visa, for example, non-EU passengers might not be able to travel from one EU member state to another which would help to ease the tension between countries regarding control on illegal immigrants.

For the microchipped EU population the automated RFID control of internal EU borders will not present any hurdle because it will not be different to RFID-based access control in any building, for instance. However, the fluent process of the automated border control depends on the speed of reading the RFID chip by the RFID reader – the slower the reading, the slower the border control and the lower the RFID advantages perceived by the microchipped travellers. Therefore, huge investments in information systems infrastructure are needed by the EU governments in order to face the RFID challenge.

The RFID implants, furthermore, eliminate the potential loss of documents by travellers and the worries of passengers during their holidays. RFID chips help the identification of victims in accidents, which, unfortunately, happen during travellers' holidays, and if they contain biometric data (like blood type, previous medical treatments, allergies to medicines, illnesses) they would facilitate the subsequent medical treatment of the victims as well.

Passenger safety, traffic and access control

After 9/11 government officials became increasingly concerned with security and passenger safety was considered a high priority issue by them. As a result, numerous rules had been introduced in the last 10 years, leading to slowing down of travel – e.g. passengers are required to be earlier at the airports, the amount of liquids taken on board the planes was limited, extensive border checks and scanning procedures were introduced. The consequence is that now passengers spend more time at airports than a decade earlier. For travellers within the European Union where flight connections at hub airports are the norm rather than the exception, the lengthy checks of luggage, documents and passengers themselves create a lot of inconveniences. It is interesting to note that such intensive checks take place at airports only, but not at railway or bus stations, although the potential number of casualties in a terrorist attack in a train might be equal to if not higher than the in a plane crash. However, with the introduction of the RFID implants and the RFID tags on luggage and tickets safety at airports, ports, bus and railway stations would increase drastically. Most importantly, the ticket and the luggage with the help of the RFID tags could be associated to a particular passenger, which

speeds up luggage processing, but also helps prevent closure of stations / ports / airports due to forgotten luggage – the local policemen could scan the RFID tag with a portable reader and identify the luggage owner; then through a computer system they could track the location of the luggage owner and proceed according to the situation (arrest, advise him/her about the forgotten piece of luggage or else). These possibilities would create a sense of security among passengers which would be beneficial to travel as a whole.

Furthermore, the RFID implants allow for the management of passenger flow at transport stations. Depending on their final destination, the system would grant them automatic access to different areas of the station / port / airport and at different time, thus reducing overcrowding. This is especially important for major hub airports in Europe such as those in Frankfurt, Munich, Paris, London, Milan, Vienna, which receive millions of passengers every year.

In hotels, the RFID microchip could be used as a key to the room, allowing access to the room for guests and for the booked period only. Additionally, they would let hotel guests to use the lifts, but only to the floor of their room (plus the ground floor, mezzanine floor, and the basement with the fitness/spa centre if it is offered by the hotel). This traffic control within the hotel improves the hotel security and guests' safety perceptions. Thefts would be sharply decreased if not entirely eliminated – thieves would not be able to enter the rooms, but even if they enter and take guests' belongings with them, the identity of the thief could be easily revealed through his RFID chip, and the stolen items could be tracked through their RFID tags. Eventual sale of the stolen items by the thief would also

be prevented by the technology. In the beach hotels of Southern Europe additional benefit would be the fact that the guests would not need to carry their key or hotel card with them to the beach with the potential risk of losing it – the electronic key to the hotel entrance, lift and room is recorded on the implanted RFID chip. Similar principle could be applied by car rental companies – car's computer could be programmed to unlock the car and start the engine only in the presence of the RFID microchip of the tourist who rents the vehicle. This will further decrease tourist's worries that the car he rents during the holiday will be stolen.

Gathering of statistical data

The Schengen agreement has removed the internal border control between EU member states. As a result, now if someone is living in Germany but goes to Amsterdam, for instance, for a daily visit and uses only cash for his/her payments, there is no proper statistical tool that would designate his/her expenses as tourist expenses unless the person uses commercial accommodation or pays by credit card ([Webster and Ivanov, 2012](#)). The situation with the statistical data collection is further aggravated, if the person is visiting friends and relatives and they spend money for his tourism consumption – the Tourism Satellite Account would not properly capture these expenditures because they cannot be classified as visitor expenditures.

The RFID implant puts tourism statistics data collection on a completely different level. Travellers do not need to identify themselves as travellers – if people travel more than a predetermined distance (e.g. 100 km) their trip would be immediately flagged by the

RFID system as a tourism trip (without discussing the travel motive: business or leisure) and the traveller's expenses during that trip would be considered as tourism expenses. This means that instead of relying on dubious samples, the honesty of data collectors and memories of travellers in tourism statistical surveys, the authorities responsible for statistical data collection would apply census – they would know the exact number of trips undertaken by people above certain limit, the exact number of foreigners visiting the country even without internal border control within the Shengen area, the exact amount of money travellers spent and the structure of their expenses. The value for these data for the European tourism industry is invaluable. Currently, it relies on surveys at border checks, omnibus surveys by marketing research companies, or ad hoc tourism marketing or statistical surveys. In any case, results from these surveys are subject to flaws – poor sample design, wrong data collection procedure, falsification of respondents' answers, short memory of respondents.

The RFID-enabled data collection removes all of the above disadvantages – it is automatic and straightforward, does not rely on respondents' memory, respondents and/or researchers cannot manipulate the primary data, data would be collected on the basis of census, i.e. all travellers, not a small sample of them. This data collection system already exists at the moment – credit and debit card operators gather sales data for their customers. However, although the credit and the debit card are issued to a specific person and ID card or passport is required for payment processing, they can also be used for cash withdrawals from ATMs that could be used for anonymous payments and cash payments are the basis for shadow economic activities in tourism (Ivanov, 2005). In a cashless

society with microchipped population, cash does not exist as a means of payments (see also [Angell and Kietzmann, 2006](#)). Therefore, all payments would be recorded and sales / VAT / excise taxes automatically paid, which means that the non-observed economy in tourism would vanish completely. This would help tourism authorities in the planning of the industry on a local, regional, national and international level.

Tourism marketing

Tourism marketing is probably the area which provides most opportunities for European tourism industry. While visas, passports, traffic control, statistical data collection reflect the consequences of human microchip implants on macro scale, here we will discuss their micro implications for the tourism enterprises.

The most important advantage of RFID implants in marketing is the opportunity to receive personalized messages and offers from the tourist companies which will help establish long lasting relationships between them and the customers. Currently the customers could have personalized content on different websites, the websites can save the history of their previous product searches, and this is made possible through the user identification – she or he logs in to the website of the company with a username and password. This is very useful but has one important limitation – if the customer is browsing different websites and needs to log in to each of them, the customer would need to remember several login details which might be a challenge. Login with a Facebook / LinkedIn account is a good option but this creates the possibility of account misuse by another person and theft of identity. With the RFID implant the access credentials to

websites do not need to be even known by the RFID holder – they are unique and recorded on the chip.

With the RFID implant customers could login automatically to websites and receive personalised messages and offers. Furthermore, RFID readers installed in resorts could be used to send messages with special offers to the smart phones and tablets of tourists that visit or pass by specific shops, restaurants, clubs or attractions. The smart phones and tablets would be recognised as belonging to the particular tourist by their own RFID tags. The special offers could be with unique ID numbers and be used by that tourist only, i.e. they are non-transferable promotions. This would decrease the lost revenues by tourist companies due to the use of promotions by people who do not classify to use them but anyway take advantage of the promotions. The RFID would also help distinguish between locals and visitors, as well as among different categories of tourists, which creates additional segmentation possibilities and provides more space for the application of revenue management techniques (like price discrimination). Furthermore, when the chip contains biometric data then the messages received by the tourist could be even more advanced – he would not need to identify as a diabetic or allergic to specific substances to anyone but yet messages he would receive about nearby restaurants would be consistent with his nutrition requirements.

The RFID implant could be connected to smart glasses (like the Google Project Glass) and the tourist could receive information on their screen when passing by an RFID reader. While in his home town the future tourist would receive information about

package tours / flight offers when he passes near an office of a travel agency, waits at dentist's office or commutes in the underground or in the bus to work. While in the destination the tourist could receive information about room availability and best available rate at the hotel he passes by, dish of the day of the nearby restaurant, working times of ski lifts and attractions, departure times for bay cruises, or details about the daily weather forecast. This augmented reality would enhance tourist's experience from the holiday, eliminate a lot of the stress associated with travel to an unfamiliar destination, increase tourist's efficiency in utilizing his own time during the trip and would, ultimately, have a positive impact on tourist's satisfaction from the holiday.

One of the major criticisms on TripAdvisor and other social media websites is that users can write fake reviews ([Yoo and Gretzel, 2009](#)). Users can make multiple fake profiles and spam the system with fake reviews which have an impact on the online reputation of the hotels listed on TripAdvisor. Companies like Booking.com have decreased the possibilities for fake review by allowing only actual users of their reservation system who have booked and stayed in a particular hotel to write a review about it. However, this does not eliminate the probability that someone else writes the review, not the actual tourist. With the help of the RFID microchip implant the writer of the hotel review will be ultimately identified as a biological entity which would eliminate any options for anonymous manipulative hotel reviews, which will enhance trust in them.

CONCLUSION

The age of the implanted microchip is upon us. Most likely, the practicality of the implanted microchip will be determined to outweigh the risks and vulnerabilities of the RFID chip. It is likely that these implanted chips in large populations may well become a reality in the near future. The question will be how the microchipped population will come into being. It may come into being via legislation stipulating that individuals must have a chip. However, the microchipped population may also come into being by voluntary actions of individuals who want the advantages that it gives them, much like the way in which consumers have embraced the cellular phone, without legislation demanding that they purchase one.

While there are some concerns regarding the capabilities of the technology, as there are for any technologies, the practical advantages of the implanted microchipped population are substantial. There are several possible issues that will prevent a microchipped population from coming into being. The first one is the development of a superior technological way of doing what the implanted RFID chip does. This seems unlikely, regardless of the weaknesses of the current technology. The second issue is the surfacing of information regarding major health and safety issues due to implanted chips. While this is possible, the widespread use of the implanted chip in animals would suggest that most humans are unlikely to experience major health problems due to the implanted chip. The third one is public resistance to microchipping. This is the most likely issue that will hinder the microchipping of large populations of people, as public suspicion will largely undermine efforts to implant microchips in people on a widespread basis.

At any rate, assuming that in the near future, many humans will be microchipped, we can envision that this technological application will have a massive impact upon the global tourism industry and the European one, in particular. The major ways in which microchipped humans will impact upon the tourism industry will be via a change in the way in which visa and passport controls are done, a change in the way in which security and access is executed, an improvement in the gathering of data, and improved marketing. While the microchip may not be a foolproof technology, it seems that the implanted chip will change a great deal in the tourism industry in Europe and this technological change will have a noteworthy impact upon human resources and capital expenditures for the industry in the near future.

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